



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,660	03/01/2002	Michael John Towler	YAMAP0804US	7895

43076 7590 12/26/2006
MARK D. SARALINO (GENERAL)
RENNER, OTTO, BOISSELLE & SKLAR, LLP
1621 EUCLID AVENUE, NINETEENTH FLOOR
CLEVELAND, OH 44115-2191

EXAMINER

DUONG, THOI V

ART UNIT	PAPER NUMBER
----------	--------------

2871

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

12/26/2006

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/087,660

Applicant(s)

TOWLER ET AL.

Examiner

Thoi V. Duong

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-6,8-20 and 24-27 ~~is/are~~ are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-6,8-20 and 24-27 ~~is/are~~ are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 10, 2006 has been entered.

Accordingly, claims 2, 7 and 21-23 were cancelled, and new claim 27 was added. Currently, claims 1, 3-6, 8-20 and 24-27 are pending in this application.

Response to Arguments

2. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3-6, 8-10, 15-17, 19, 20 and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Acosta et al. (Acosta, EP 0996028A2) in view of Nonaka et al. (Nonaka, USPN 6,897,918 B1).

Re claims 1, 3 and 4, as shown in Fig. 1, Acosta discloses a liquid crystal device comprising a nematic liquid crystal 3, voltage means for applying a voltage across said liquid crystal, and two substrates 1, 1' each provided with an alignment layer 2, 2' (col. 1, paragraphs 1-5), wherein, as illustrated in Fig. 10:

said liquid crystal is sandwiched between said two substrates;

said nematic liquid crystal can be placed in at least one operating state and at least one non-operating state (cols. 1 and 2, paragraphs 8 and 9);

at least one of said alignment layers is provided with a plurality of surface protrusions 8, 8' formed from an anisotropic material as shown in Fig. 10 (cols. 14, paragraph 83); and

said protrusions affect alignment both near the surface where a high pre-tilt in region A is produced and within the bulk of the liquid crystal,

wherein said liquid crystal is divided into a plurality of pixels each having an active region (pixel region), and wherein the active region of each said pixel overlaps with at least one of said protrusions, so that nucleation occurs within said active region (Fig. 10 and col. 14, paragraph 83).

Acosta discloses a liquid crystal device that is basically the same as that recited in claims 1, 3 and 4 except for protrusions having a height which is at least 10% or 20% or substantially 50% of the thickness of the liquid crystal and the active region of each said pixel partially overlapping with at least one of said protrusions and at least one of said protrusions being limited to a peripheral area of the active region.

As shown in Fig. 6, Nonaka discloses a liquid crystal device comprising a plurality of protrusions 11 for controlling liquid crystal alignment (col. 20, lines 48-57) and spacers 18 for fixing the cell gap (col. 2, lines 44-49),

wherein the protrusions 11 have a height of 0.5 to 6 micrometer and the spacers have a height of 1 to 9 micrometer (col. 11, lines 7-38).

Accordingly, the protrusions 11 can have a height which is about 50% to 66% of the height of the spacers or the thickness of the liquid crystal.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the liquid crystal device of Acosta with the teaching of Nonaka by forming protrusions for controlling liquid crystal alignment having a proper height in order to obtain a sufficient divisional aligning effect and facilitate the manufacturing process (col. 11, lines 7-13).

Re claims 5 and 16, Acosta discloses that at least some of said protrusions nucleate said liquid crystal into said operating state from said non-operating state when said voltage exceeds a threshold value and said operating and non-operating states are topologically distinct from each other (cols. 1 and 2, paragraph 8 and 9; col. 4, paragraph 22; and col. 12, paragraph 73).

Re claim 6, Acosta discloses that at least some of said protrusions isolate said operating state from said non-operating state or from another operating state (col. 12, paragraph 73).

Art Unit: 2871

Re claim 8, Acosta discloses that said liquid crystal is divided into a plurality of pixels and wherein each said pixel is surrounded by at least one of said protrusions, so that the pixel is isolated (col. 14, paragraph 83).

Re claims 9 and 10, Acosta discloses that said nematic liquid crystal is a pi-cell or splay bend device (SBD) (col. 1, paragraphs 1-3).

Re claim 15, Acosta discloses that the anisotropic protrusions are formed from a polymerisable reactive mesogen (cols. 13 and 14, paragraphs 81 and 82).

Re claims 17 and 19, Acosta discloses that when said voltage is substantially zero different regions of said liquid crystal exist in first non-operating state (regions A and C) and second non-operating state (region B), and the first non-operating state is stabilized by said anisotropic protrusions 8, 8' as illustrated in Fig. 10, which is a modification of the device shown in Fig. 8, wherein said first non-operating state is the same state as said operating state (col. 9, paragraphs 52-54 and col. 14, paragraphs 83-84).

Re claim 24, the protrusions 8, 8' in Fig. 10 of Acosta are trapezoidal anisotropic protrusions.

Re claims 25 and 26, Nonaka discloses that the shape of the protrusions are triangular or mitre-shaped (col. 9, line 66 through col. 10, line 19).

Re claim 27, Acosta discloses that at least a portion of the at least one of said alignment layers is rubbed (col. 6, paragraph 36). Nonaka also discloses that an alignment layer is rubbed for aligning liquid crystal (col. 1, lines 30-34).

Finally, re claim 20, as to the product-by-process limitation “a method of producing the liquid crystal device comprising the steps of forming a reactive mesogen layer on substrates, curing said layer by irradiating said layer with UV light through a mask to leave said one of said substrates coated with anisotropic protrusions” recited in claim 20, it has been recognized that “Even through product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process”. *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985). See also MPEP 2113.

5. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Acosta et al. (Acosta, EP 0996028A2) in view of Nonaka et al. (Nonaka, USPN 6,897,918 B1) as applied to claims 1, 3-6, 8-10, 15-17, 19, 20, and 24-27 above and further in view of Funada et al. (Funada, USPN 4,232,947).

The liquid crystal device of Acosta as modified in view of Nonaka above includes all that is recited in claims 12-14 except for the protrusions being tilted anisotropy protrusions or twisted anisotropy protrusions.

Funada discloses a liquid crystal device in which the protrusions are tilted anisotropy protrusions (col. 3, lines 32-46) or twisted anisotropy protrusions (col. 3, line 61 through col. 4, line 30).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the device of Acosta with the teaching of Funada by forming protrusions which are tilted or twisted anisotropy protrusions so as to attain uniform alignment of liquid crystal molecules and hence to reduce free energy due to liquid crystal molecules (Abstract).

6. Claims 11 and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Acosta et al. (EP 0996028A2) in view Nonaka et al. (Nonaka, USPN 6,897,918 B1) as applied to claims 1, 3-6, 8-10, 15-17, 19, 20, and 24-27 above, and further in view of Ulrich et al. (Ulrich, USPN 6,618,113 B1).

The liquid crystal device of Acosta as modified in view of Sasaki above includes all that is recited in claims 11 and 18 except for a bistable twisted nematic (BTN).

As shown in Figs. 12 and 16, Ulrich discloses a liquid crystal device comprising a bistable twisted nematic (BTN) liquid crystal layer 23 and twisted anisotropic spacer walls 10 (col. 7, lines 35-46 and col. 9, lines 43-47) so as to avoid substantial reduction in contrast ratio (col. 4, lines 27-32).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the liquid crystal device of Acosta et al. with the teaching of Ulrich et al. by employing a BTN liquid crystal and twisted anisotropic protrusions to create a first non-operating state as T state and improve contrast ratio for the display (col. 4, lines 27-32).

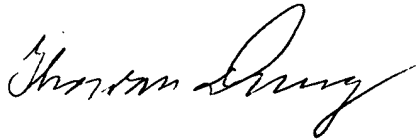
Art Unit: 2871

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms, can be reached at (571) 272-1787.

Thoi V. Duong



12/15/2006